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PAGE ONE

# Global Surge in Use of Coal Alters Energy Equation

## Shift Offers a Way to Slow Rise in Demand For Oil; Worries on Global Warming

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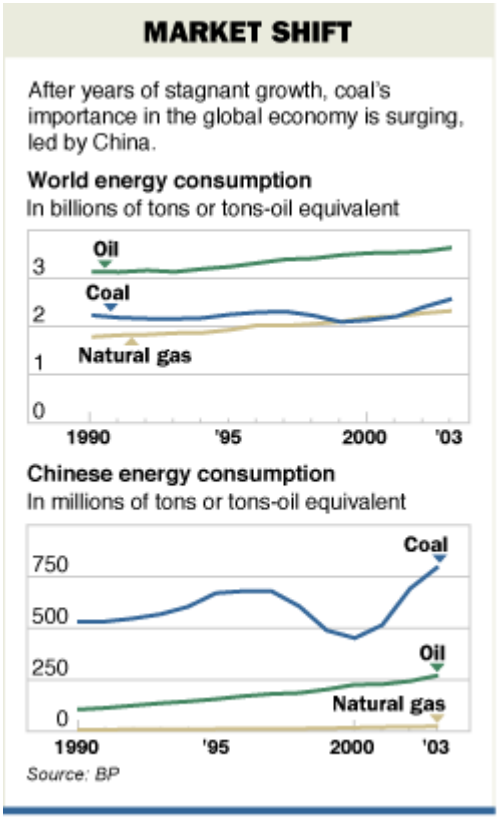


A world-wide surge in the mining and use of coal is helping offset some of the economic strains of rising oil demand and marks an important shift in energy consumption with long-term consequences for the global energy equation and the environment.

The trend is especially notable in the two countries that are the biggest new sources of global energy demand: China and India. These nations have enormous coal reserves but not nearly enough oil and gas.

By some measures, world-wide coal consumption has been rising faster than the use of any other source of energy, including crude oil, natural gas, hydroelectricity and nuclear power. Last year, world coal consumption rose 6.9%, compared with 2.1% for oil, according to BP PLC, the global energy company.

This year, coal production in the U.S. is expected to climb to a record of over 1.2 billion tons, an increase of more than 3.7% from 2003. About 90% of the coal mined in the U.S. is used to produce electricity, and coal produces about half the U.S.'s electricity needs. In China, coal production is expected to grow about 200 million tons, or 11.8%, this year to 1.9 billion tons.

Coal is primarily used around the world to generate electricity and for steel production. But electricity plants can also run on other fuels, including natural gas or petroleum-based fuels. Indeed, most developed countries have tried to move away from using coal, but those efforts are in many ways offset as developing countries like China continue to choose coal for their newest facilities.

Coal use has surged for several reasons. It's easily transported on barges or trains. In many cases, power plants are located close to the mines, reducing the plants' cost of operation. And, the world still has huge untapped coal reserves that can be developed at a low cost, unlike oil. Although strong demand has caused coal prices to shoot up more than 80% in the past year, to more than $50 a ton, it's still an economical power generator. It costs $3 to generate a million British thermal units, or BTUs, of power from coal, compared with more than $7 for natural gas and just over $8 for oil, according to the U.S. Energy Information Administration. In basic power generation, the heat produced by burning coal drives equipment that creates electricity.

With the high demand and heftier price, coal-mining companies are ramping up production, even as many oil giants hold back on new drilling. **Peabody Energy** Corp., based in St. Louis, the largest U.S. coal producer, plans to double its annual production to 400 million tons by 2010. China's largest coal miner, Shenhua Group, is planning to double its production to 200 million tons in the period. Production also is shooting up in Colombia, Australia and Indonesia.

The activity is increasing the odds that coal will play a bigger role in the world's energy mix in the next decade than many analysts expected.

"We lived in a period of plentiful energy, and now we're entering a period of tighter supplies. ... Coal will fill some of that gap," says Gerard McCloskey, a coal-industry consultant and editor of a trade newsletter in London.

To be sure, coal never went away. It has been an important part of the energy equation in the U.S. since the 1800s. The United Kingdom, which closed much of its coal industry in recent decades, derives about 18% of its energy from coal. World-wide, coal contributed 26% of energy needs last year, compared with 37% for oil and 24% for natural gas, with the balance coming from a mix of hydroelectric and nuclear power.

## ASIA'S THIRST FOR OIL

1

**China and India are developing an addiction to oil. As the world's two most populous nations industrialize, their demand for oil is putting them on a collision course with another big consumer: the U.S.**

Coal's importance is rising as developing countries look for the least-expensive options to fuel their booming economies. By helping countries like China and India power everything from factories to air-conditioning units, continued heavy use of coal could curtail some of their need for oil or natural gas. This could prevent oil and gas prices from soaring even higher.

If China "started to use oil to generate electric power, we'd really be in trouble" in terms of supply shortfalls, says Pietro Nivola, an energy expert at the Brookings Institution in Washington.

Largely because of inexpensive coal-based energy, aluminum giant **Alcoa** Inc. is expanding a 52-year-old aluminum smelter in Rockdale, Texas, that was to be closed just a couple of years ago.

"We had the intention to shut this facility down and sell the power," said Kevin Lowery, a spokesman for Alcoa, based in Pittsburgh. "But the economics tell you that you don't need to do that."

For all the upside, many experts believe that burning more coal could worsen the planet's environmental problems. Coal-related emissions are blamed for a rise in respiratory illness, mercury poisoning and other dire health consequences. Such emissions are believed to contribute to global warming.

In the U.S., big coal-burning utilities are spending billions of dollars in the next few years to clean up emissions from power plants. **Southern Co.**, which is the dominant utility in a four-state region including Georgia, has budgeted $5 billion for scrubbers and other equipment that reduce nitrous oxides, sulfur oxides and toxic mercury, which can travel thousands of miles.

The environmental hazards are greater for China and India, which are expected to make up two-thirds of global coal demand through 2030. China has seven of the world's 10 most-polluted cities, largely owing to fumes from coal.

Some of the countries' biggest producers are making sizable investments to upgrade facilities and experiment with clean-coal technologies. Beijing's Shenhua Group has completed a $6 billion overhaul of its coal-mining operations that use mine-monitoring equipment from **Rockwell Automation** Inc. of Milwaukee to boost efficiency.

But China's coal sector is highly fragmented, and many of its smaller producers are unable, or unwilling, to make such investments. "The leading edge of the industry in

China is absolutely world-class," says an executive at a Western coal company operating in China. "The trailing end is Dickensian."

Chinese officials, aware of the environmental concerns, have outlined numerous policies to reduce the impact of coal-burning plants. These include requiring all new plants to install desulphurization equipment and providing incentives to scrub emissions.

Even so, sulphur-dioxide emissions climbed last year after signs of improvement in recent years. Some of the pollution appears to be wafting off to other countries, and may be creating problems as far away as the U.S. In addition to such air pollutants, coal-fired power plants also emit carbon dioxide, the chief suspected global-warming gas.

The U.S. has rejected the Kyoto Protocol, the international treaty that will curb global-warming emissions, and the pact doesn't cover developing nations like China and India. Coming international negotiations, however, are likely to focus on producing a successor agreement to Kyoto that would include the U.S., China and India, in the belief that any accord that doesn't include these major emitters won't do much to curb global warming.

Pollution "is a global problem and it should be addressed by global solutions," says Fatih Birol, the chief economist of the International Energy Agency in Paris.

Part of the problem is that demand in China appears to be growing faster than regulators' ability to police emissions. A few years ago, when demand wasn't so strong, the Chinese government moved to shut thousands of substandard coal operations. Chinese coal production tumbled by more than 25% to about 500 million tons of oil equivalent in 2000, according to BP data.

Then China's economy took flight. By 2003, Chinese coal production had soared to 842 million tons of oil equivalent. If recent trends hold, production could rise to nearly one billion tons of oil equivalent this year.

Chinese officials have announced ambitious plans to diversify the country's energy supply, quadrupling its nuclear-power generation capacity by 2020 and adding numerous terminals to process imported liquefied natural gas. Chinese officials say these and other investments should reduce coal's share of the country's power needs to about 54% from 67% currently, while natural gas will increase to 10% from 3% now.

But many independent economists doubt that coal's share in China will decline significantly, given that coal is inexpensive and plentiful. Most of China's new power plants are coal-fired, and will be around for decades. Adding more nuclear, gas and hydroelectric facilities will involve massive investments that could make the power they generate more expensive, limiting its attractiveness. In the U.S. and Europe, however, the cost of cleaning up coal plants and the anticipated cost of carbon capture, as well as a run-up in natural-gas costs, are making nuclear power more competitive.

China's coal dependence may decrease in percentage terms over the next several decades, "but not as much as some people would think," says Anthony Cordesman, an energy expert at the Center for Strategic and International Studies, a Washington think tank.

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